Using TRMM Tools to Investigate the Affects of Tropical Storm Agatha on Guatemala

A Case Study

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Background

- First tropical storm of the 2010 Pacific season
- Originated in the Eastern Pacific near Central America
- Began on May 29th, and ended on May 30th
- Made landfall on Mexico-Guatemala border
- Agatha was a slow-moving system, which allowed for an excess of 20 in (510 mm) of rain to fall over El Salvador, Nicaragua, and Guatemala
- Heavy rainfall caused landslides and flooding which killed 180 people
- We will examine the affects that Agatha had on Guatemala using a variety of tools looking at TRMM precipitation data
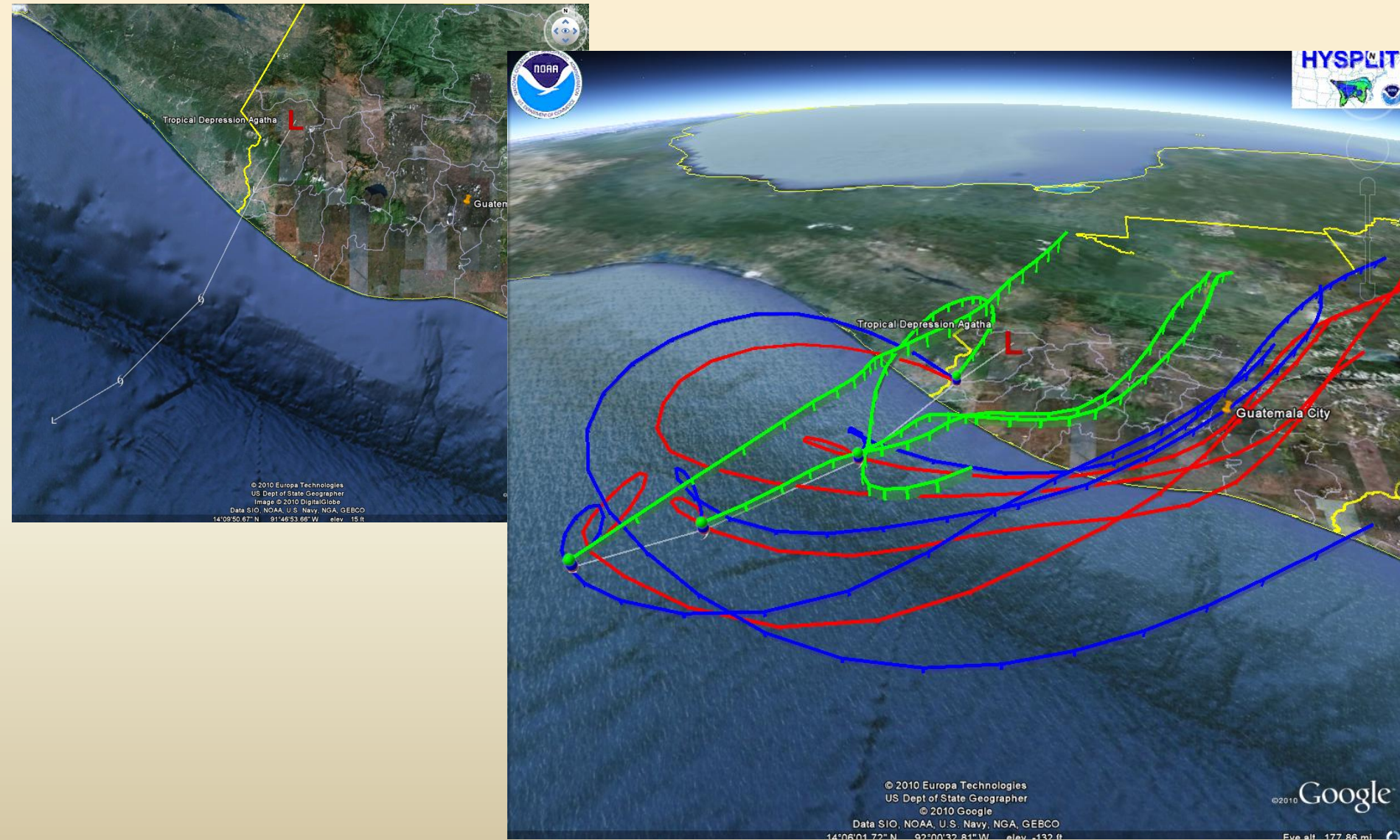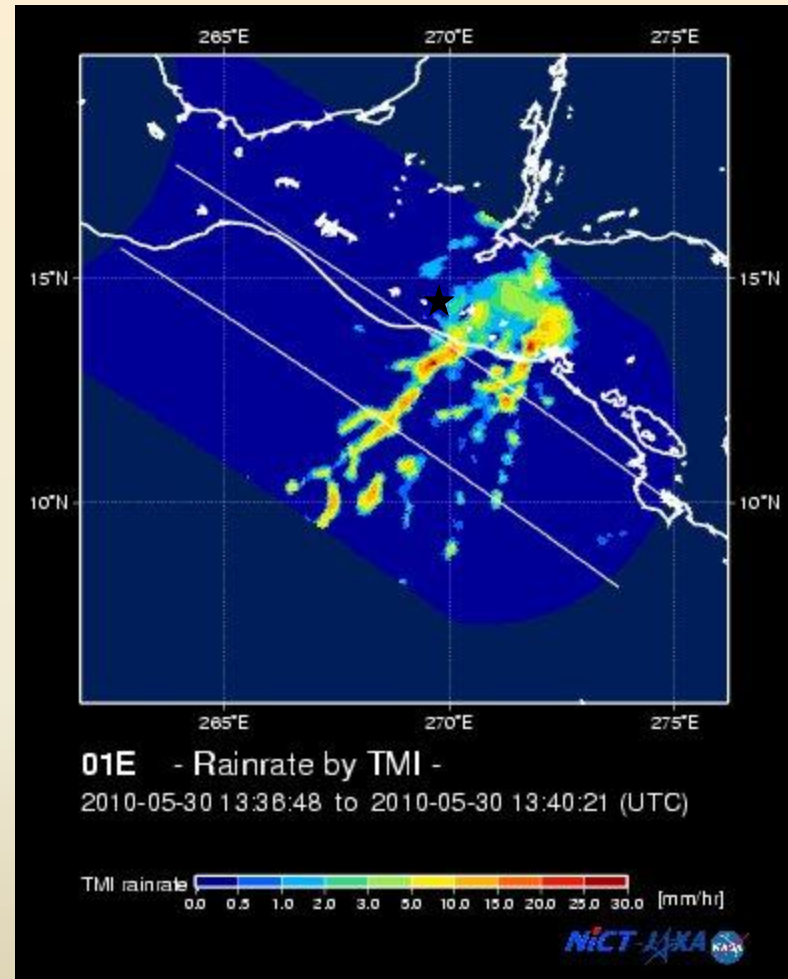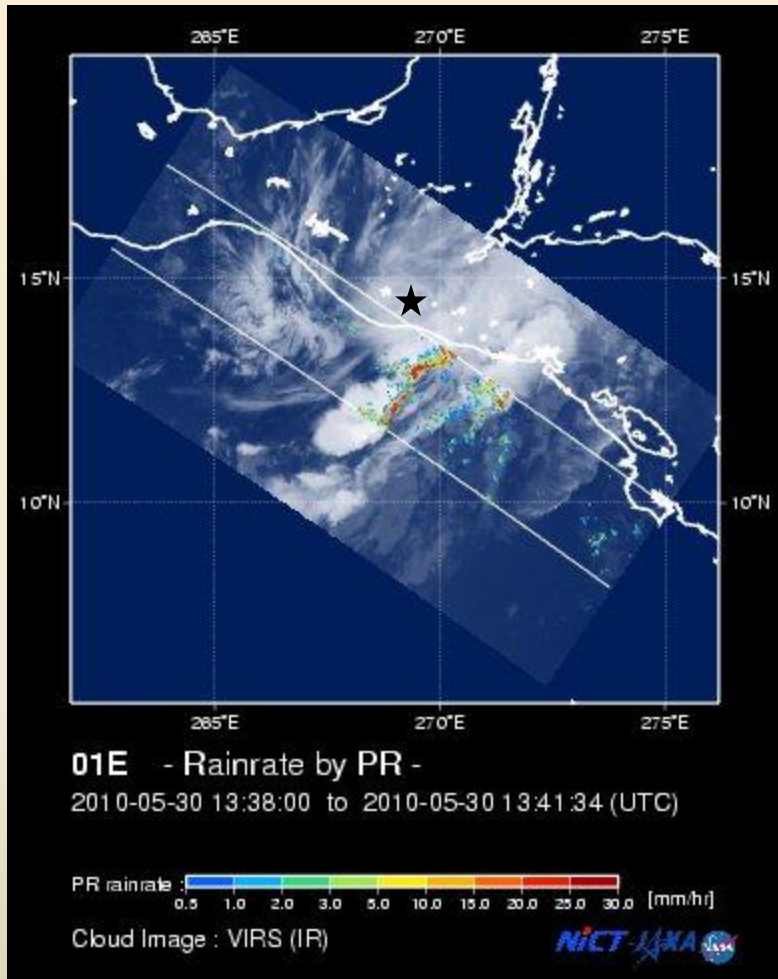
Storm Track

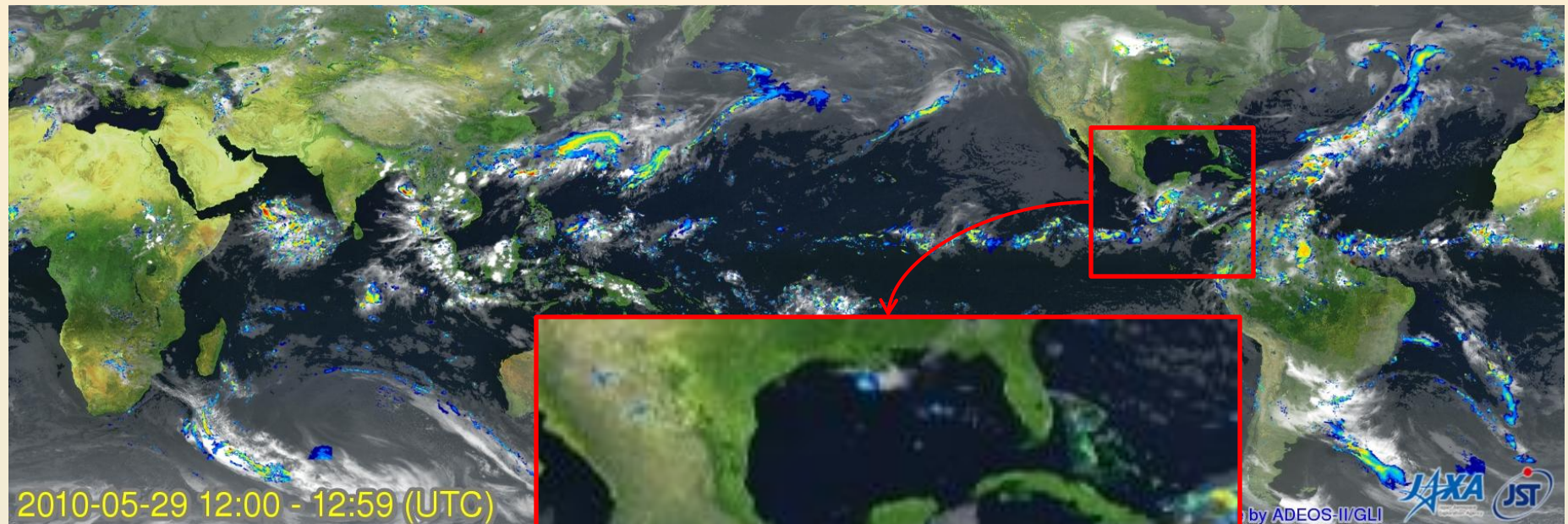# Storm Trajectory By Hour and Location
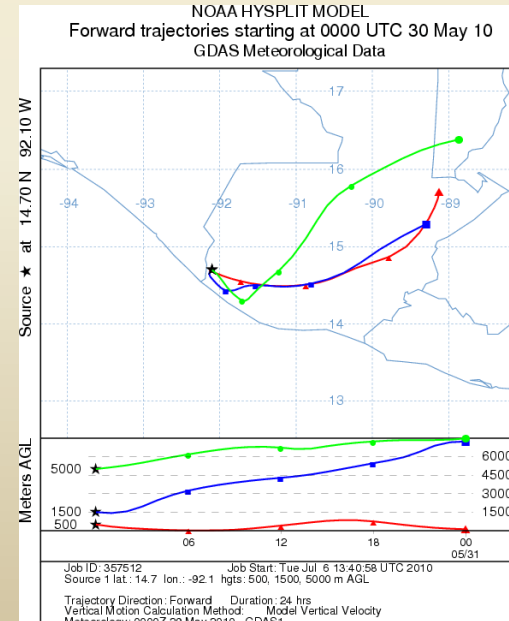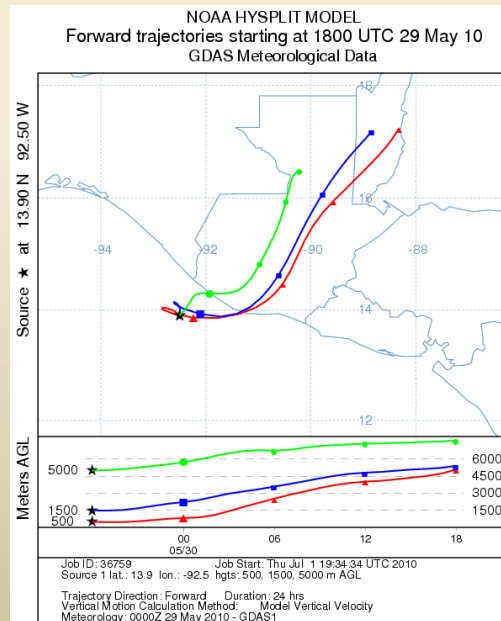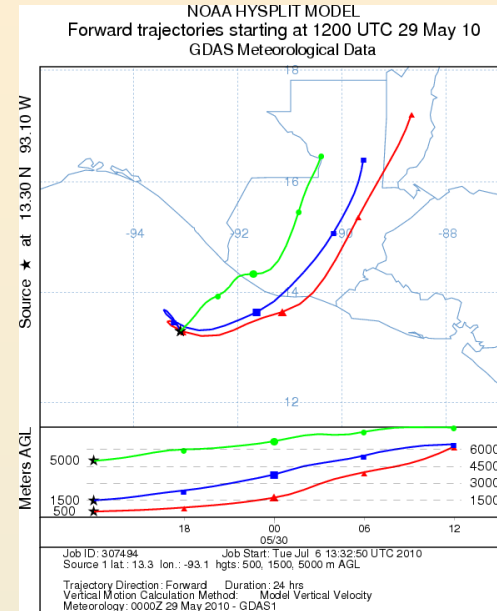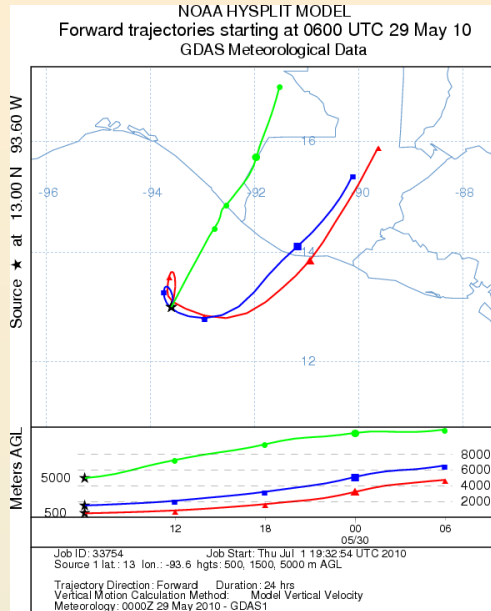
Storm Tracks by Hour and Location on Google Earth

Rain Rate by PR and TMI (JAXA)

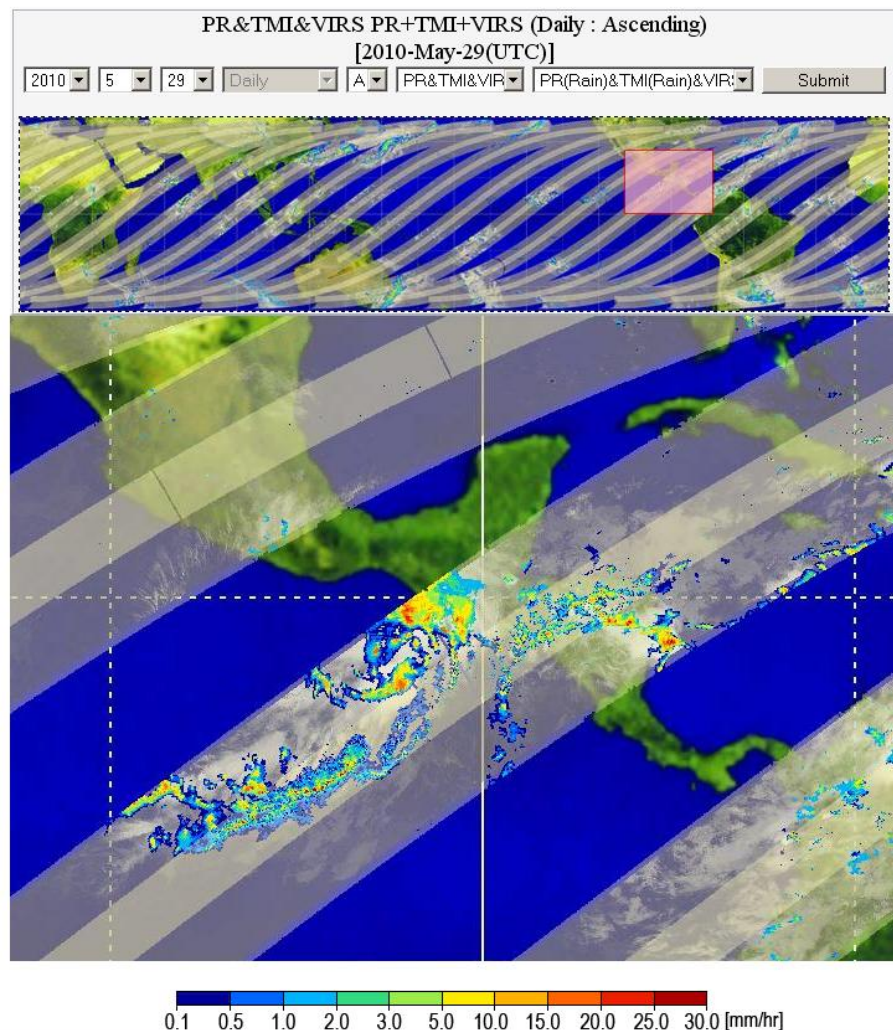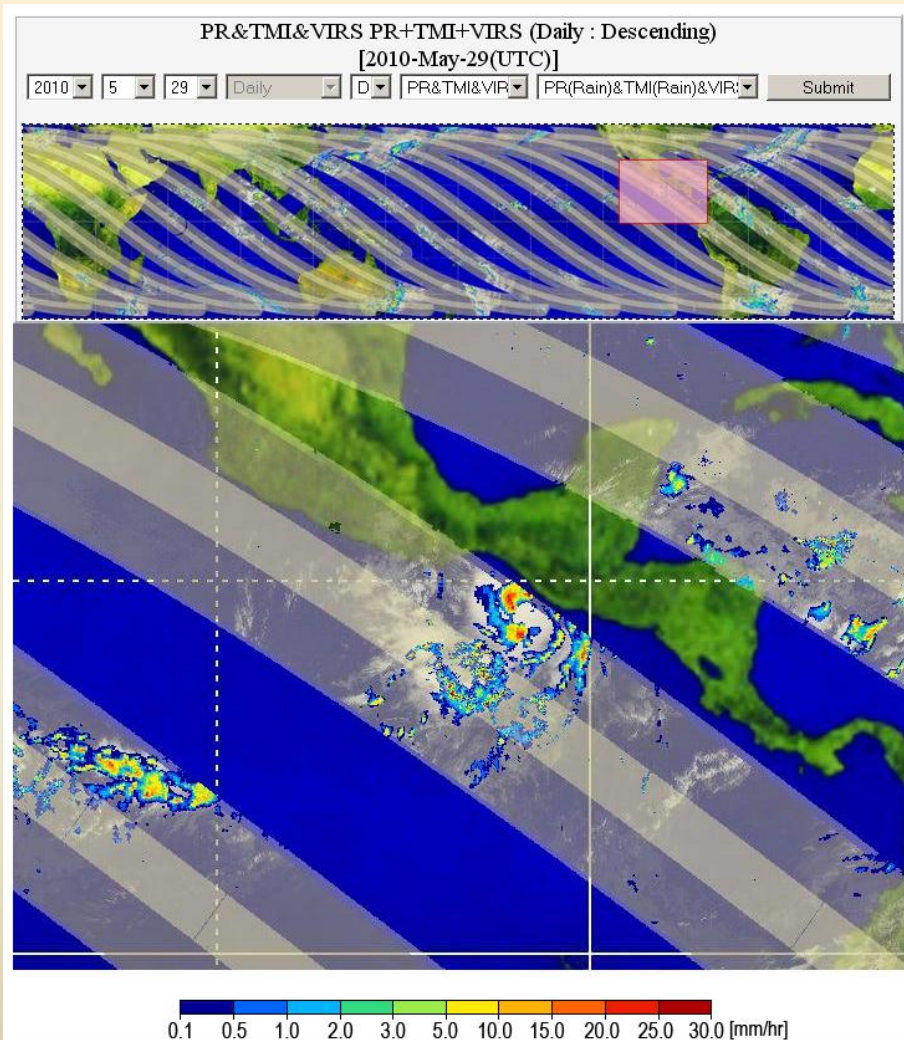http://www.eorc.jaxa.jp/TRMM/NRTtyphoon/america_e.htm

Global Rainfall Map in Near Real Time (JAXA)

2010-05-29 12:00 - 12:59 (UTC)

by ADEOS-II/GLI

Global Rainfall Map in NRT on 5/29/2010 from 12:00-12:59 UTC

http://sharaku.eorc.jaxa.jp/GSMaP/archive/jpg/20100 5/gsmap_html_image.20100529.1200.jpg
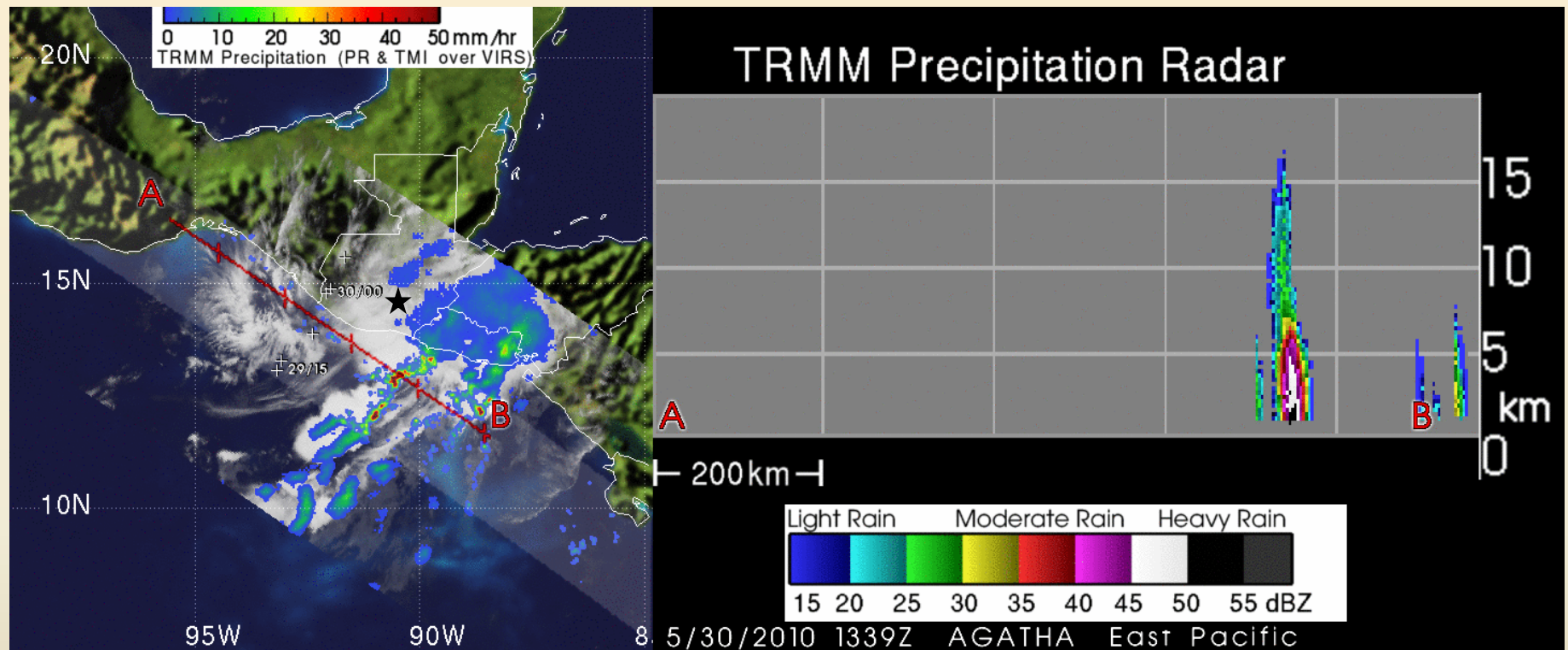
PR, TMI, and VIRS Rain Rate in Real Time (JAXA)

TRMM Real-Time images from 5/29/2010

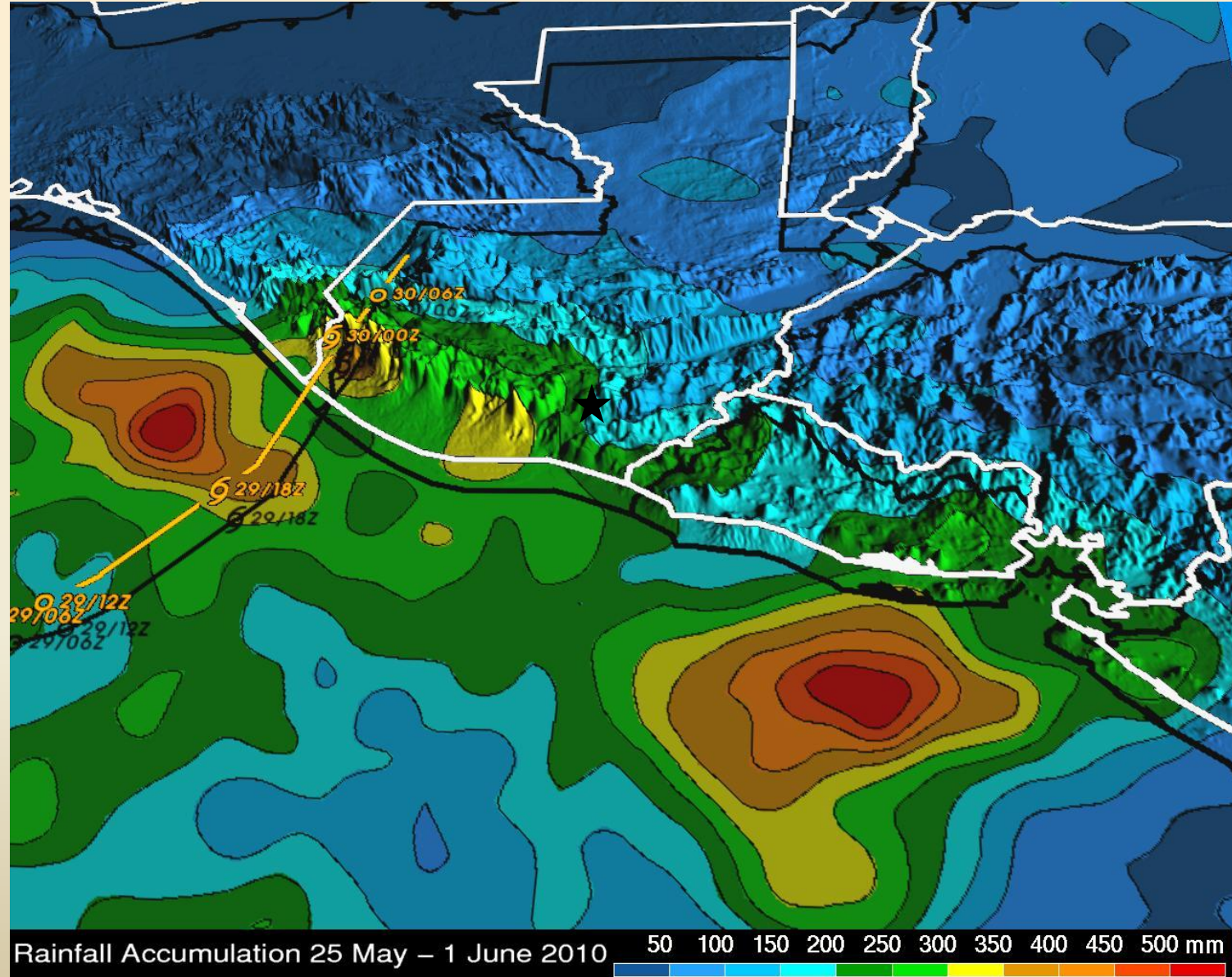http://sharaku.eorc.jaxa.jp/trmm/RT/index_e.html
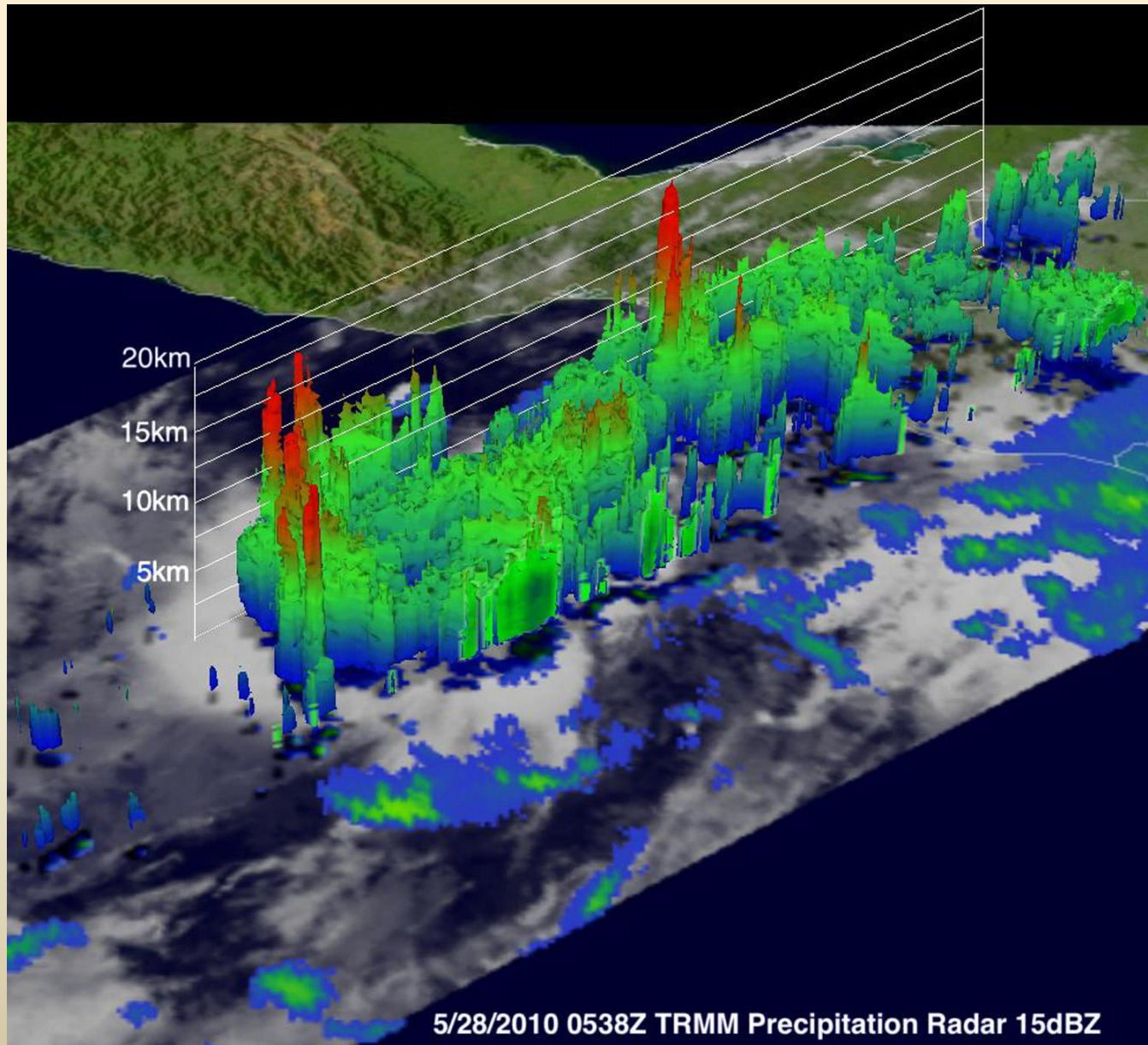
Rain Rate and Vertical Distribution by PR (NASA)

http://trmm.gsfc.nasa.gov/trmm_rain/Events/EPAC/EPAC.2010-5-30T1339Z_____AGATHA.gif
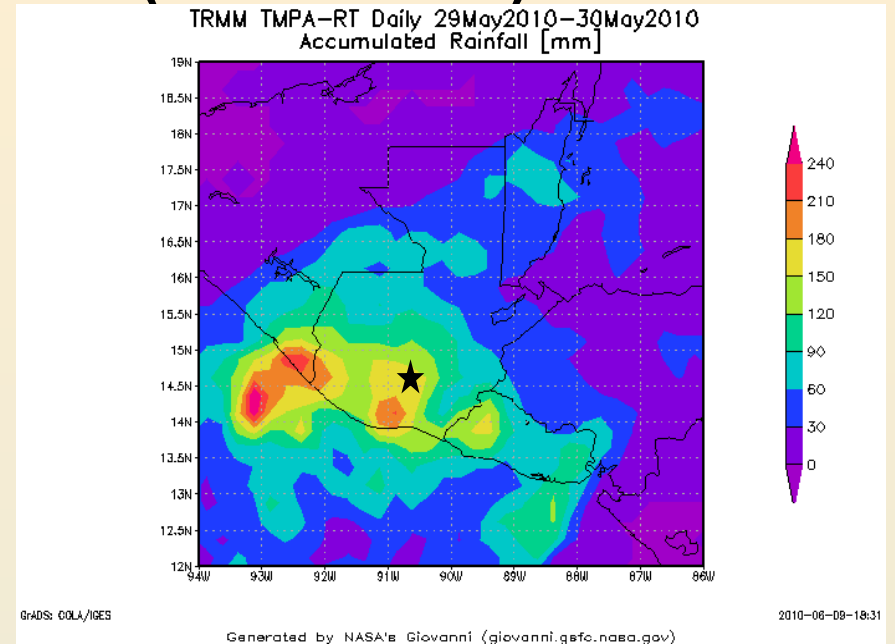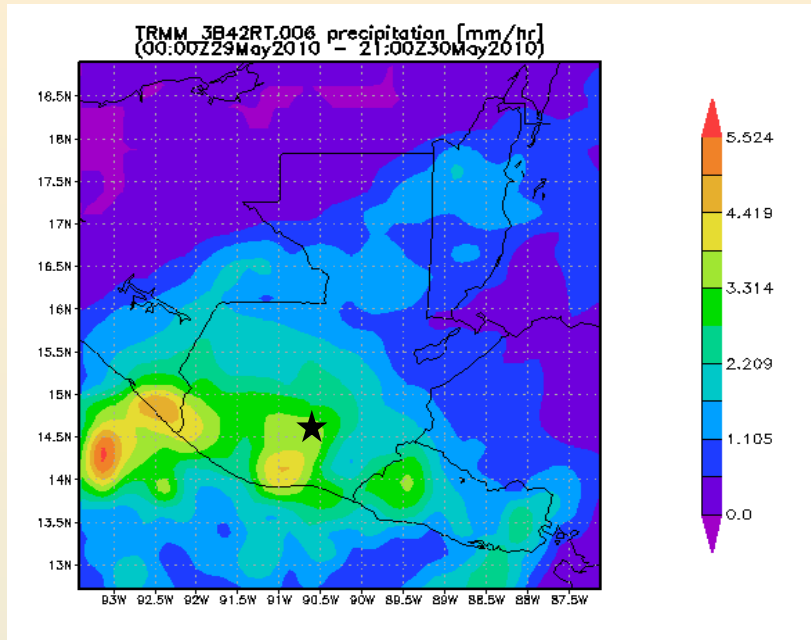
★ - Guatemala City

Rain Accumulation (NASA)

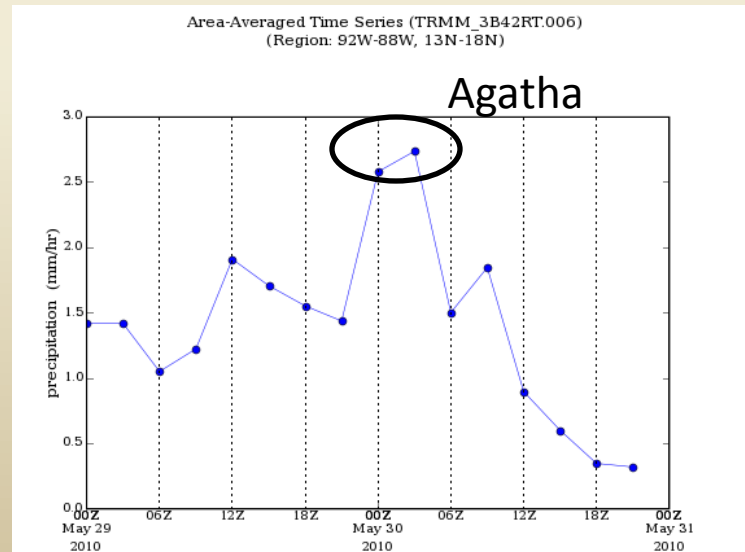Rainfall Accumulation 25 May – 1 June 2010

50 100 150 200 250 300 350 400 450 500 mm

Vertical Precipitation Distribution (NASA)

20km

15km

10km

5km

5/28/2010 0538Z TRMM Precipitation Radar 15dBZ

http://www.nasa.gov/images/content/460225main_AGATHA-TRMM-large.jpg

Rain Rate, Accumulated Rainfall and Time Series (Giovanni)

TRMM_3B42RT.006 precipitation [mm/hr]
(00:00Z29May2010 - 21:00Z30May2010)

TRMM TMPA-RT Daily 29May2010-30May2010
Accumulated Rainfall [mm]

GrADS: COLA/IGES

Generated by NASA's Giovanni (giovanni.gsfc.nasa.gov)

2010-06-09-18:31

All images generated with GIOVANNI TOVAS
http://disc2.nascom.nasa.gov/Giovanni/tovas/

Area-Averaged Time Series (TRMM_3B42RT.006)
(Region: 92W-88W, 13N-18N)

Agatha

Hovmoller Diagrams by Latitude and Longitude (Giovanni)
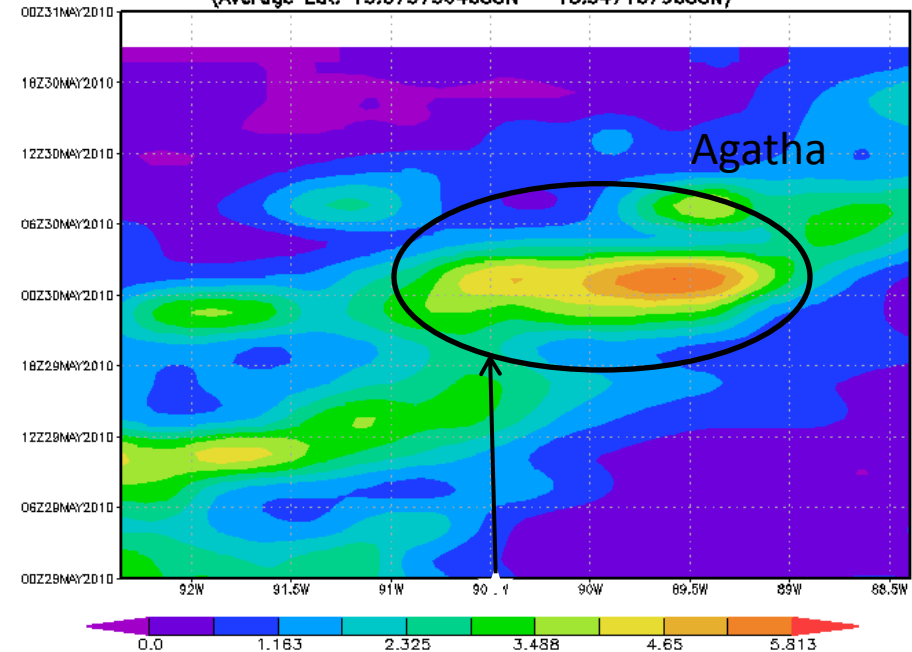
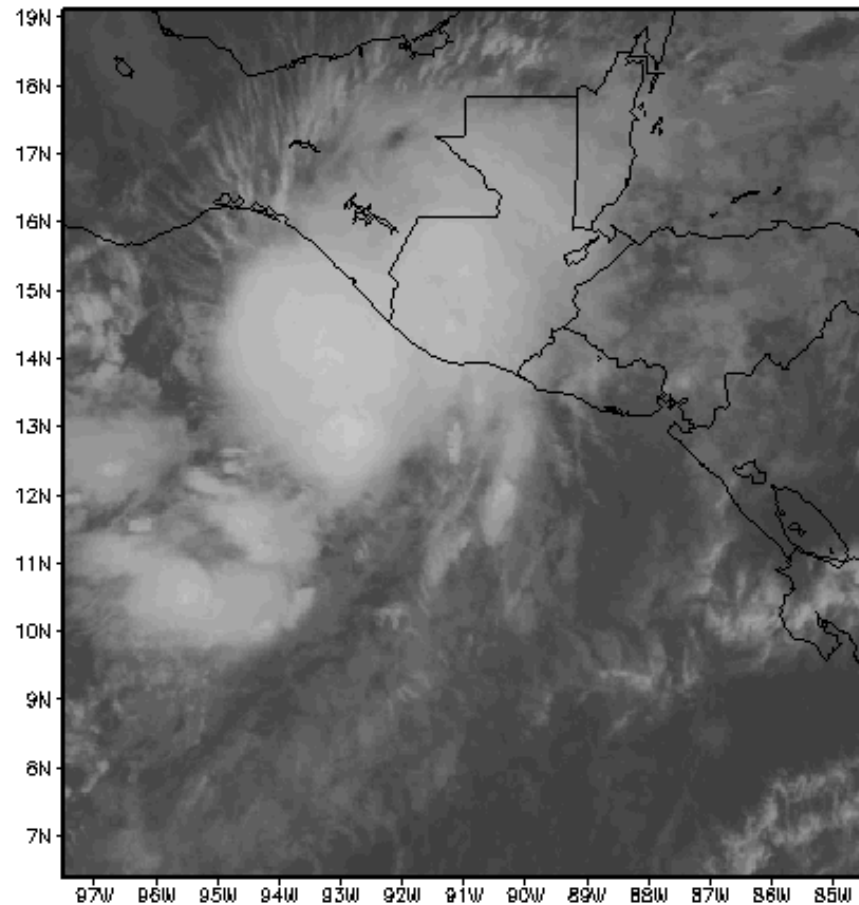# Rain Rate in Google Earth (Giovanni)
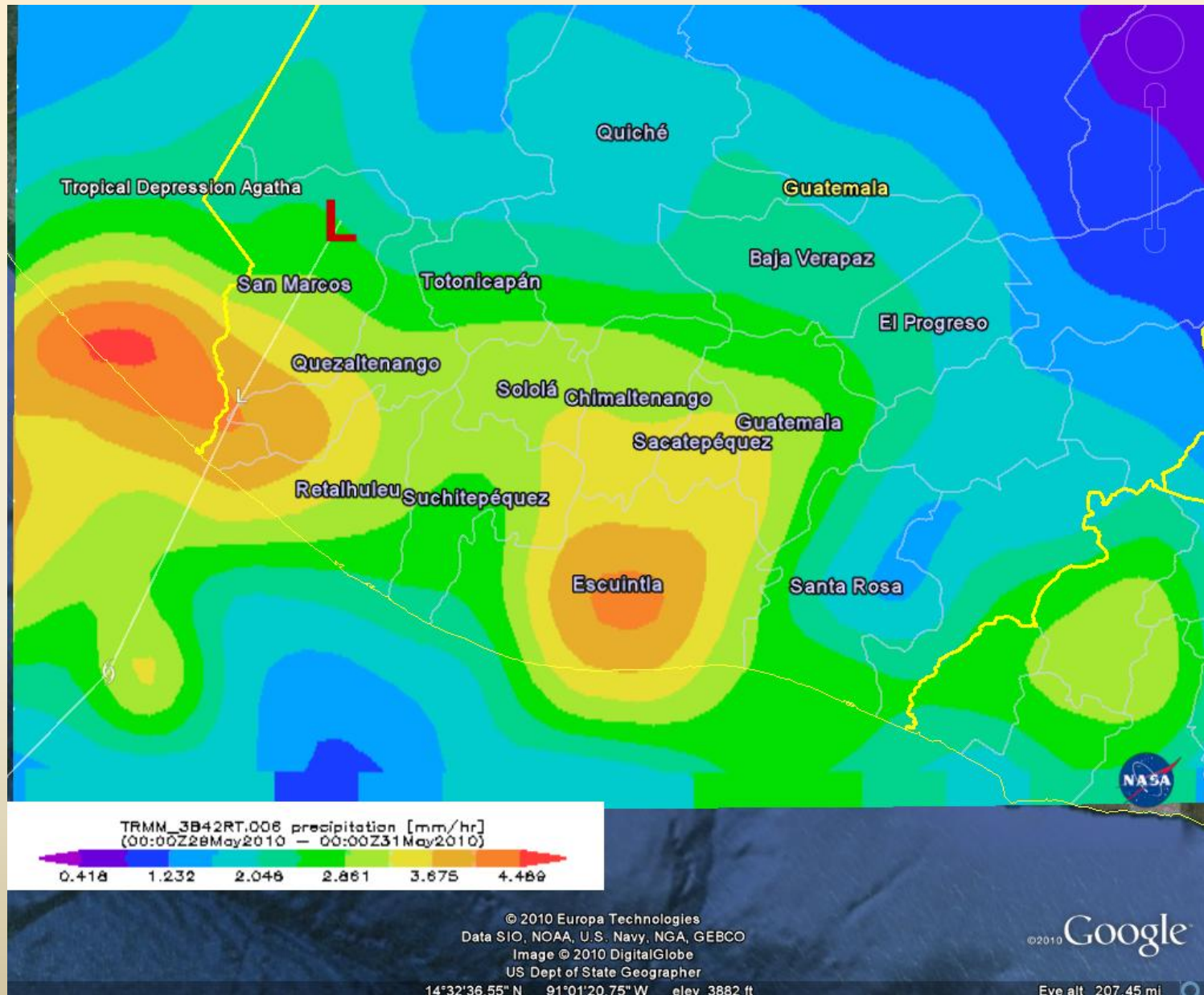
Rain Rate in Google Earth (Giovanni) with Flooding/Landslide Locations
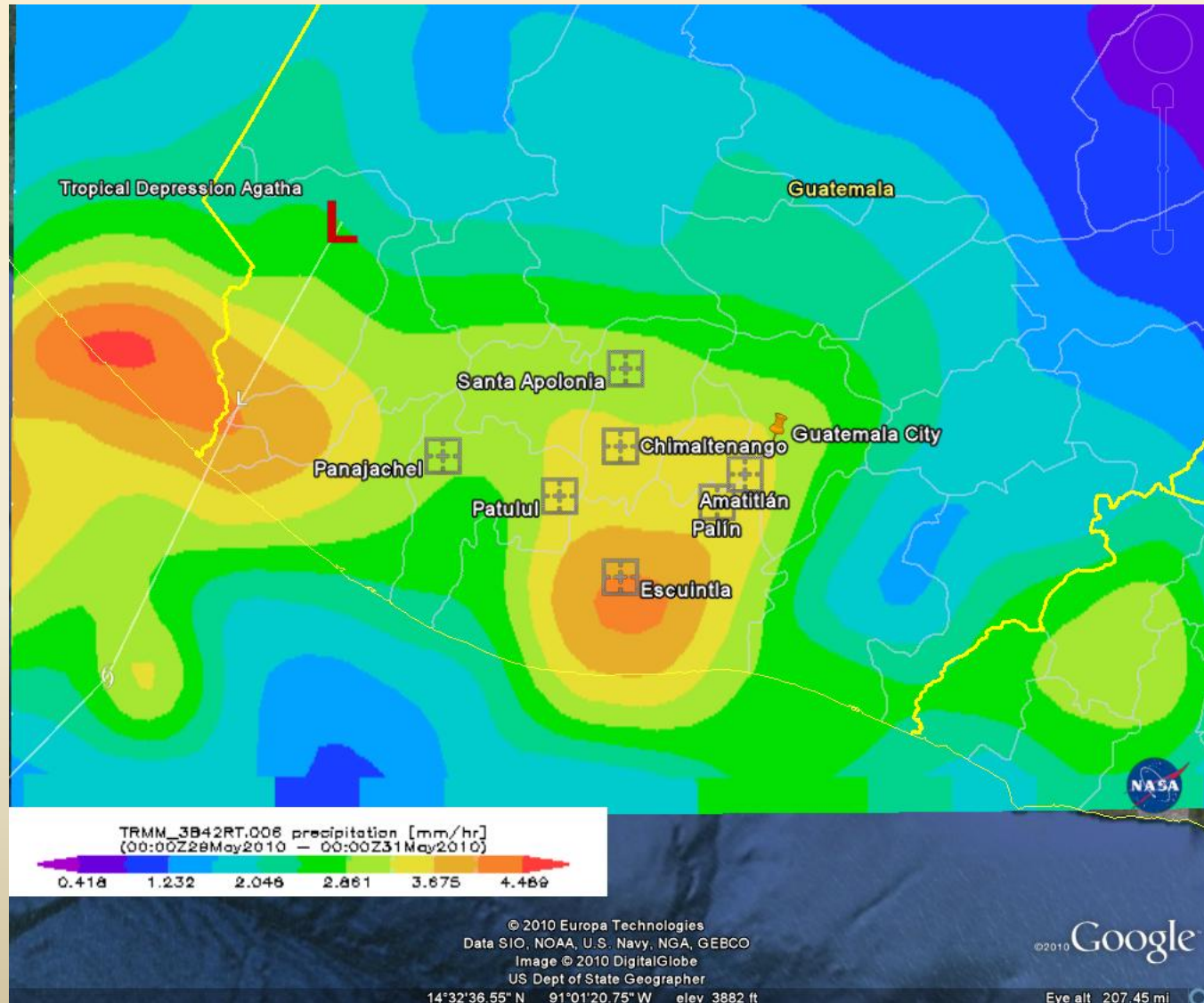
Merged IR Animation
(Hurricane Analysis Tool)

Global Merged IR (00min15Z29MAY2010)
Created by NASA Goddard GES DISC

Landslide Risks (SERVIR)

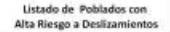

Areas at risk for landslides 5/29

http://www.servir.net/tormenta_tropical_agatha_mayo_2010

SERVIR
Map Viewer

MODIS Rapid Fire in Google Earth
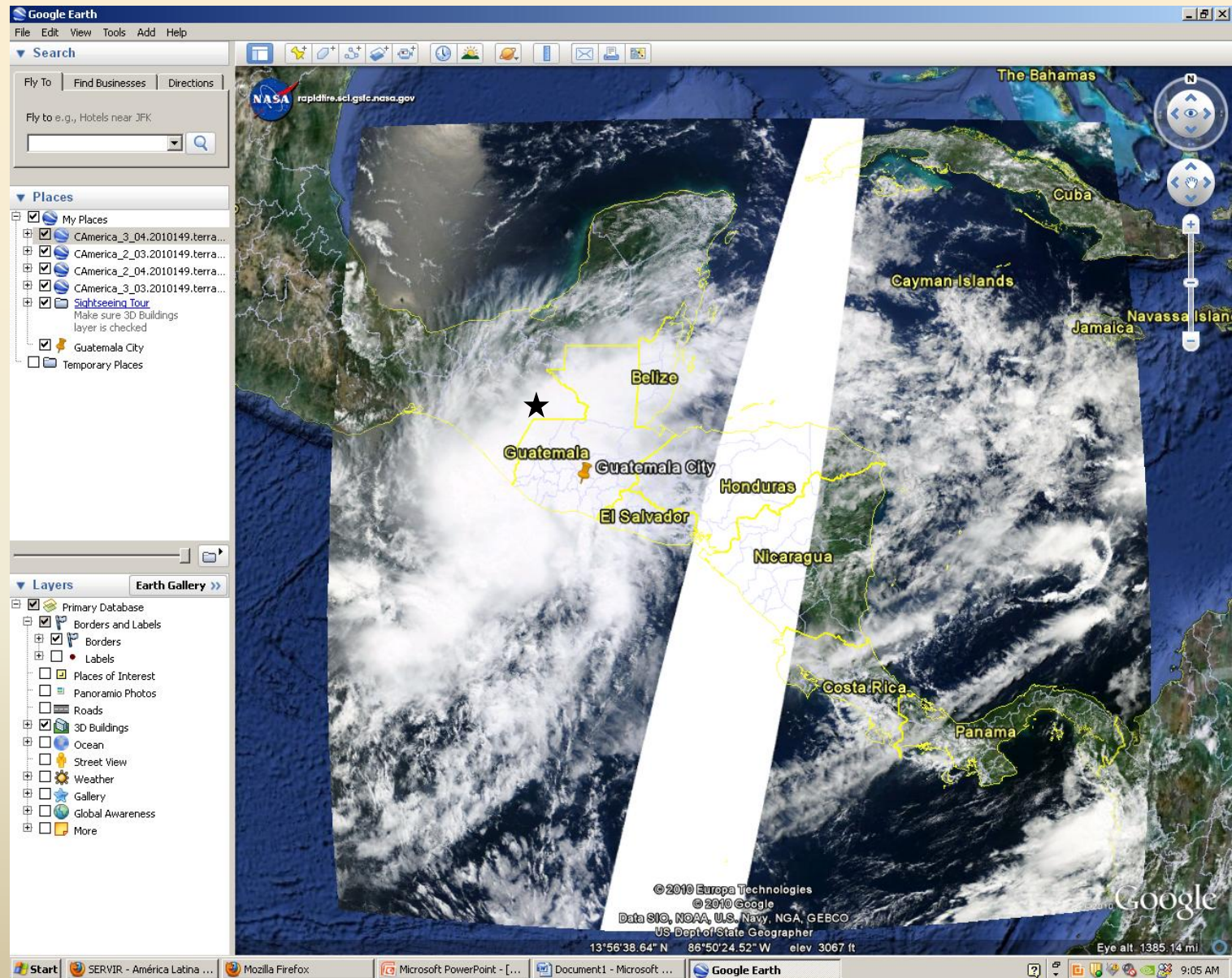
CloudSat Reflectivity in Google Earth
May 28

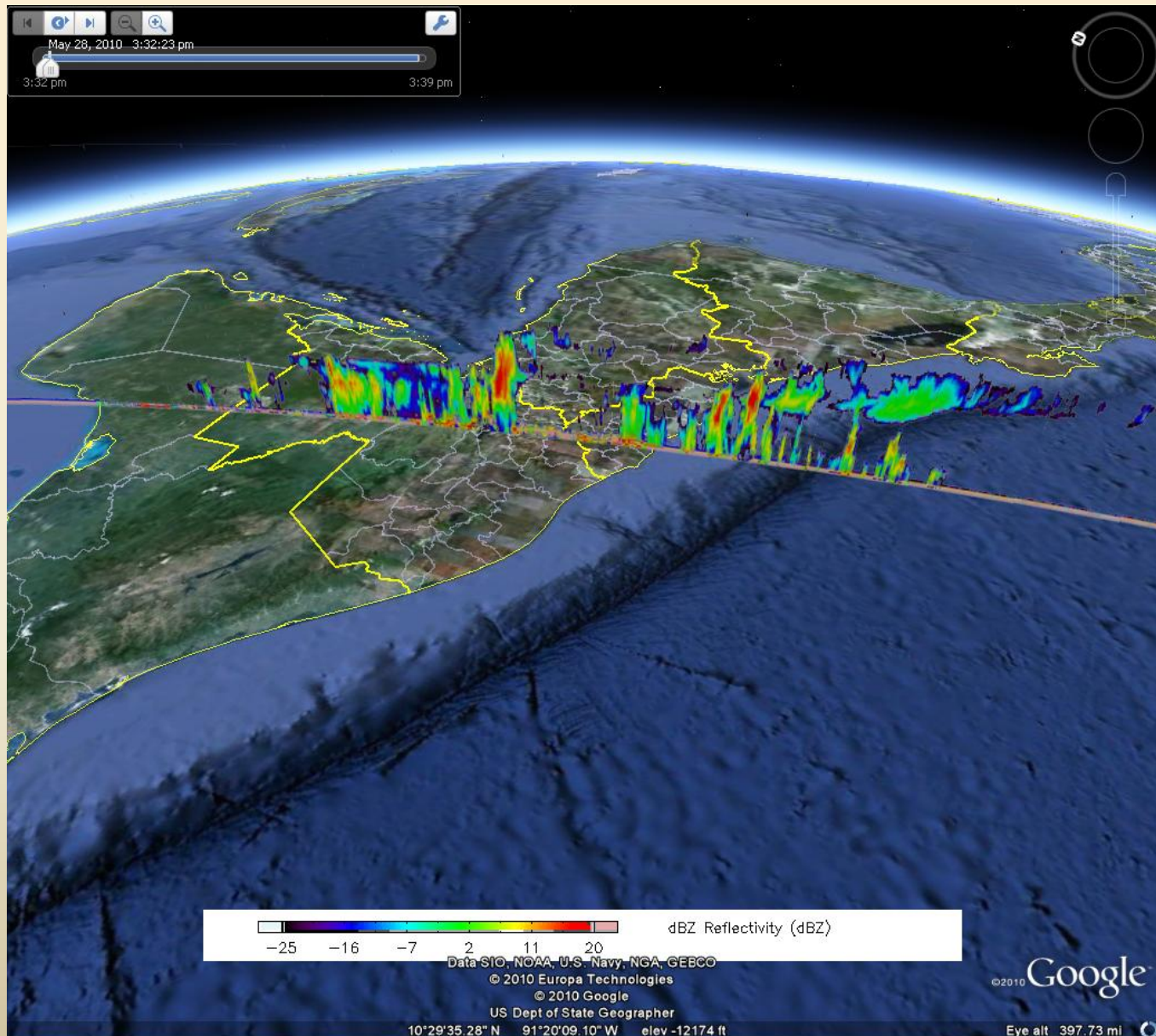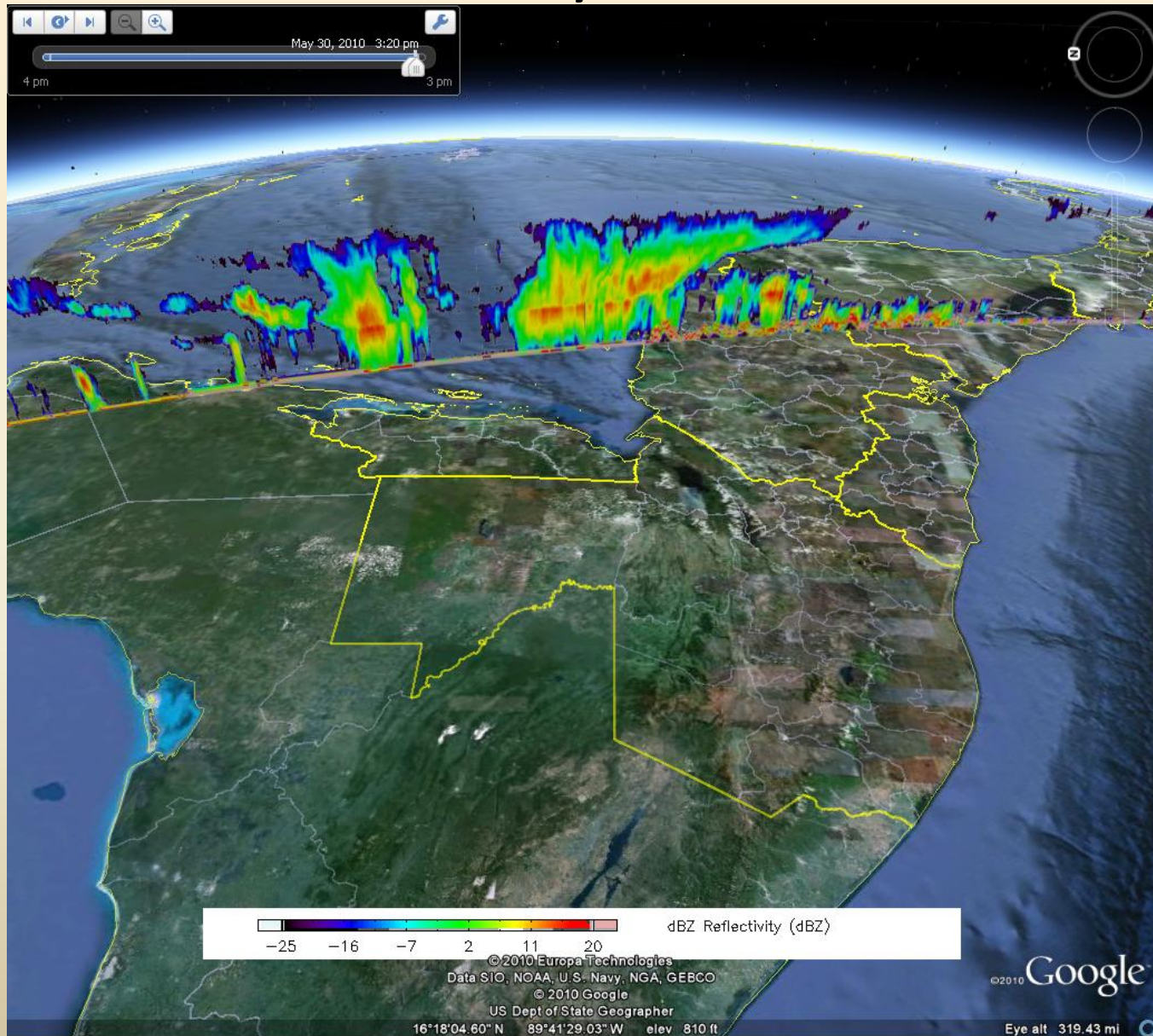# CloudSat Reflectivity in Google Earth
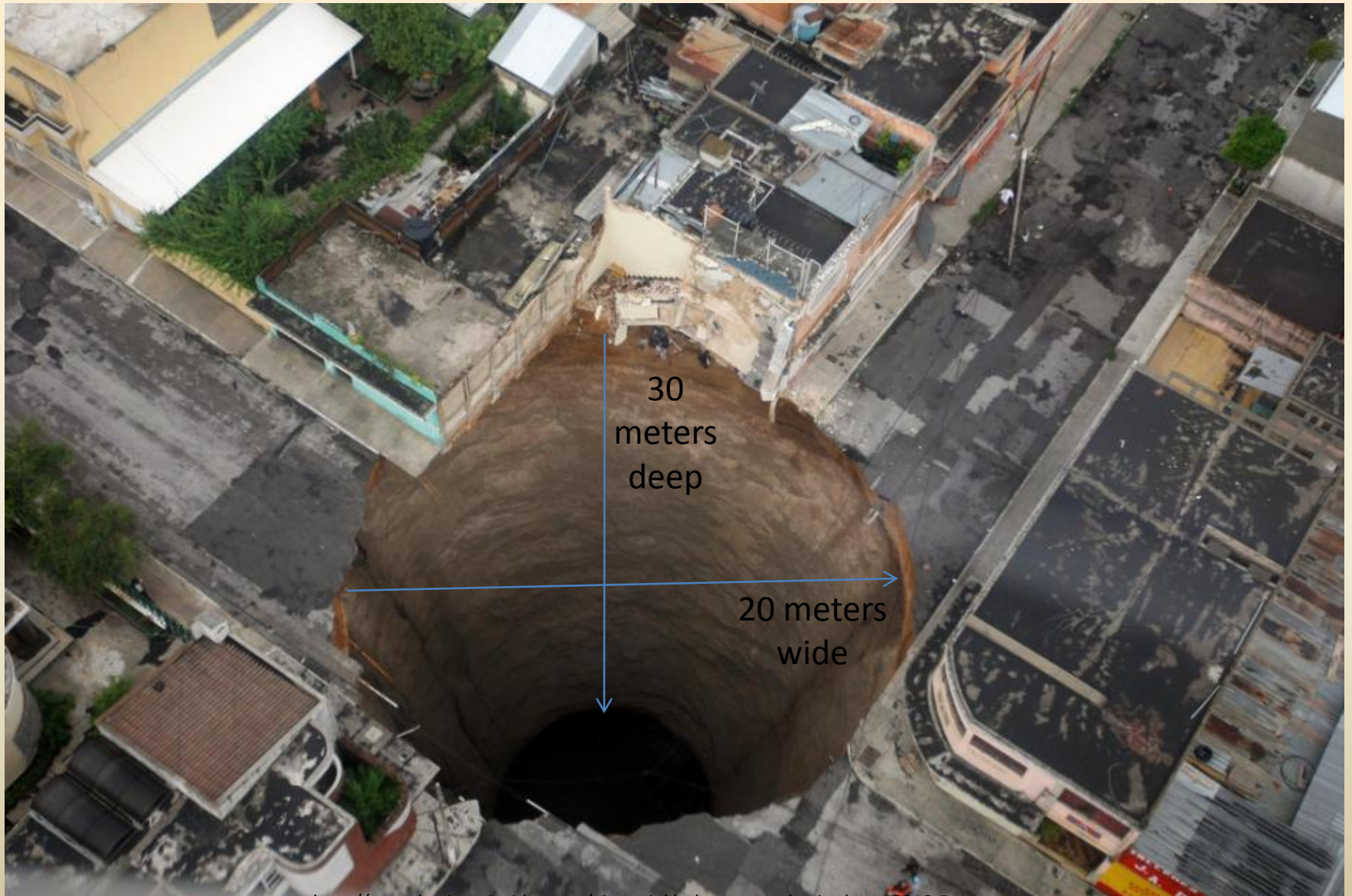# May 30

Analysis

- Heavy rainfall was evident in Guatemala during Tropical Storm Agatha

- The area in and around Guatemala City had some of the highest accumulated rainfall values, and some of the highest rainfall rates

- The heavy precipitation caused high landslide risks, followed by actual landslides, flooding, and…

Guatemala City: May 31, 2010

30 meters deep

20 meters wide

Link to a Video of:
[River Flooding in Panajachel, Guatemala](http://www.youtube.com/watch?v=t100xk59f3I&feature=channel)

http://www.youtube.com/watch?v=t100xk59f3I&feature=channel

Link to Images:

http://blogs.denverpost.com/captured/2010/06/01/captured-tropical-storm-agatha/
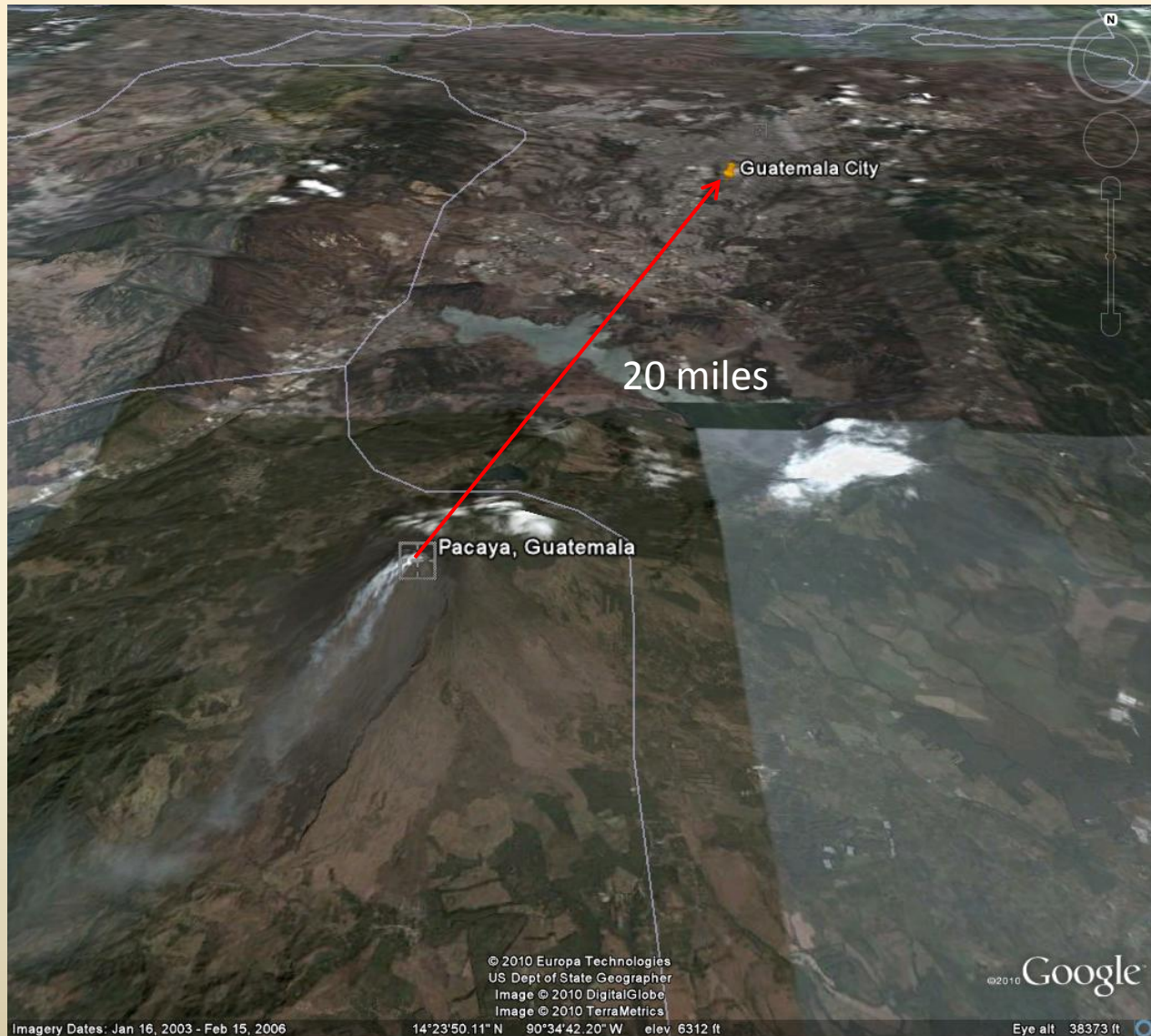
Pacaya Volcano

- Just two days before Tropical Storm Agatha hit Guatemala, the Pacaya Volcano erupted
- On Thursday, May 27th at 20Z the volcano began spewing ash and small rocks that covered parts of Guatemala City
  - The international airport was closed
  - In some places, ash was 7 cm thick
- 1,600 people evacuated their homes
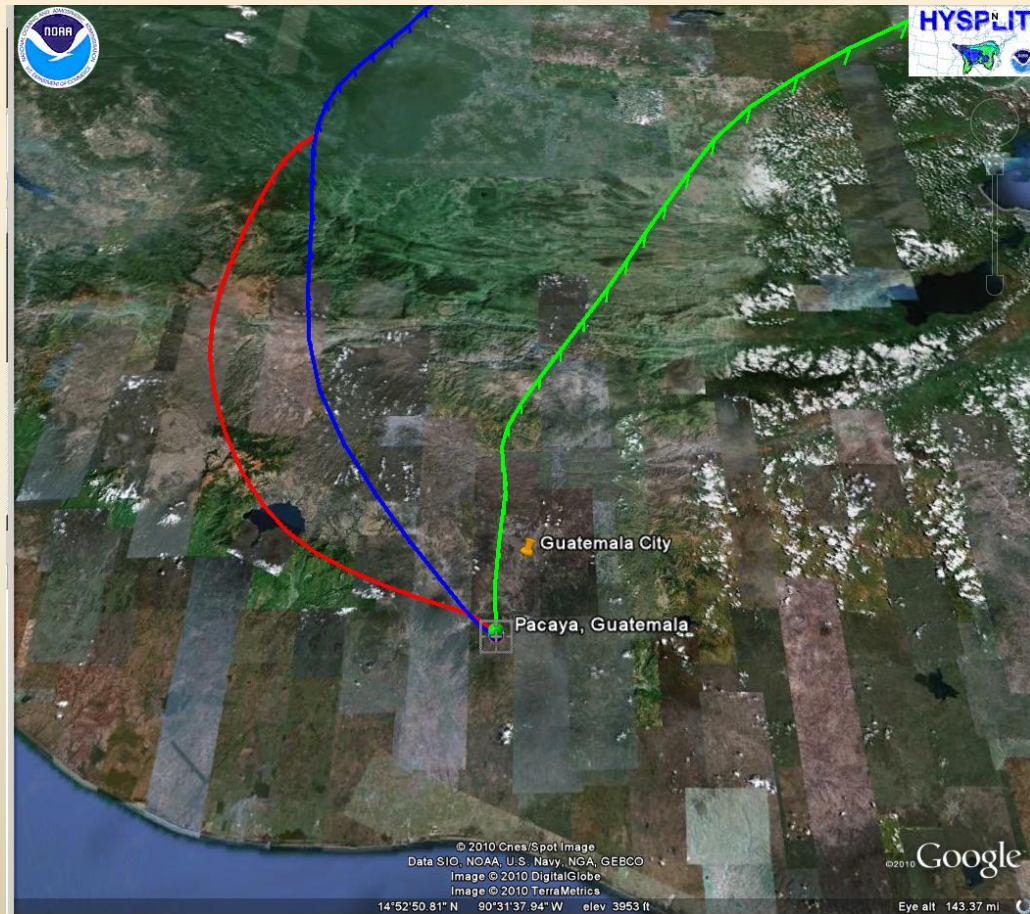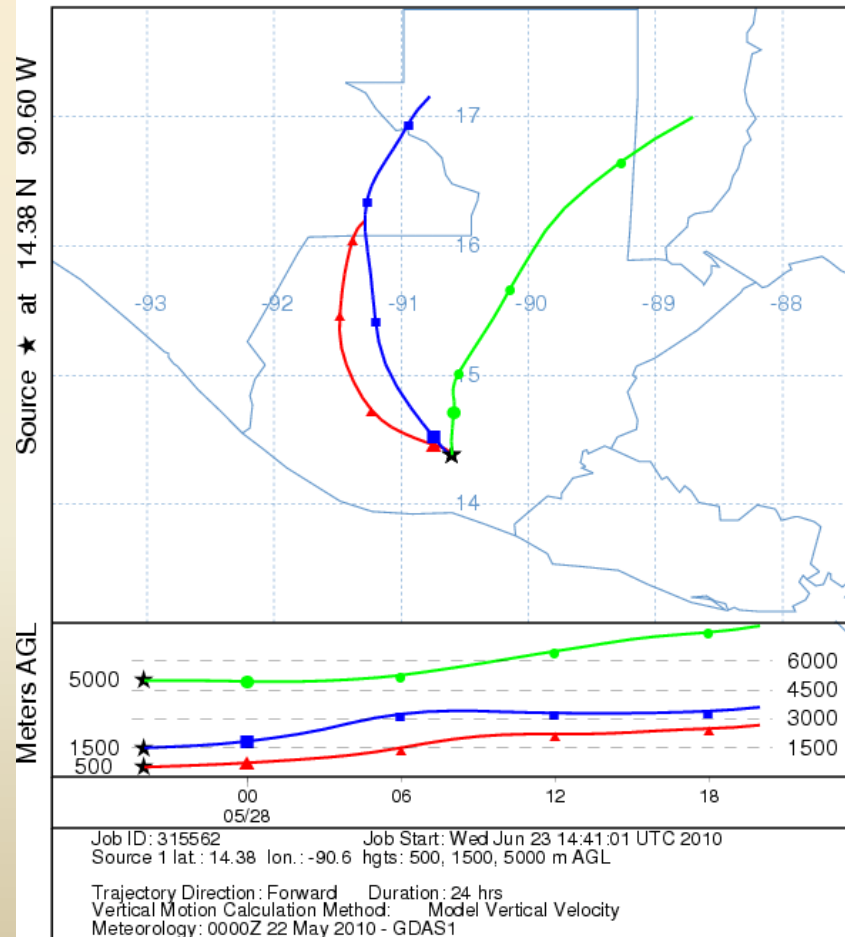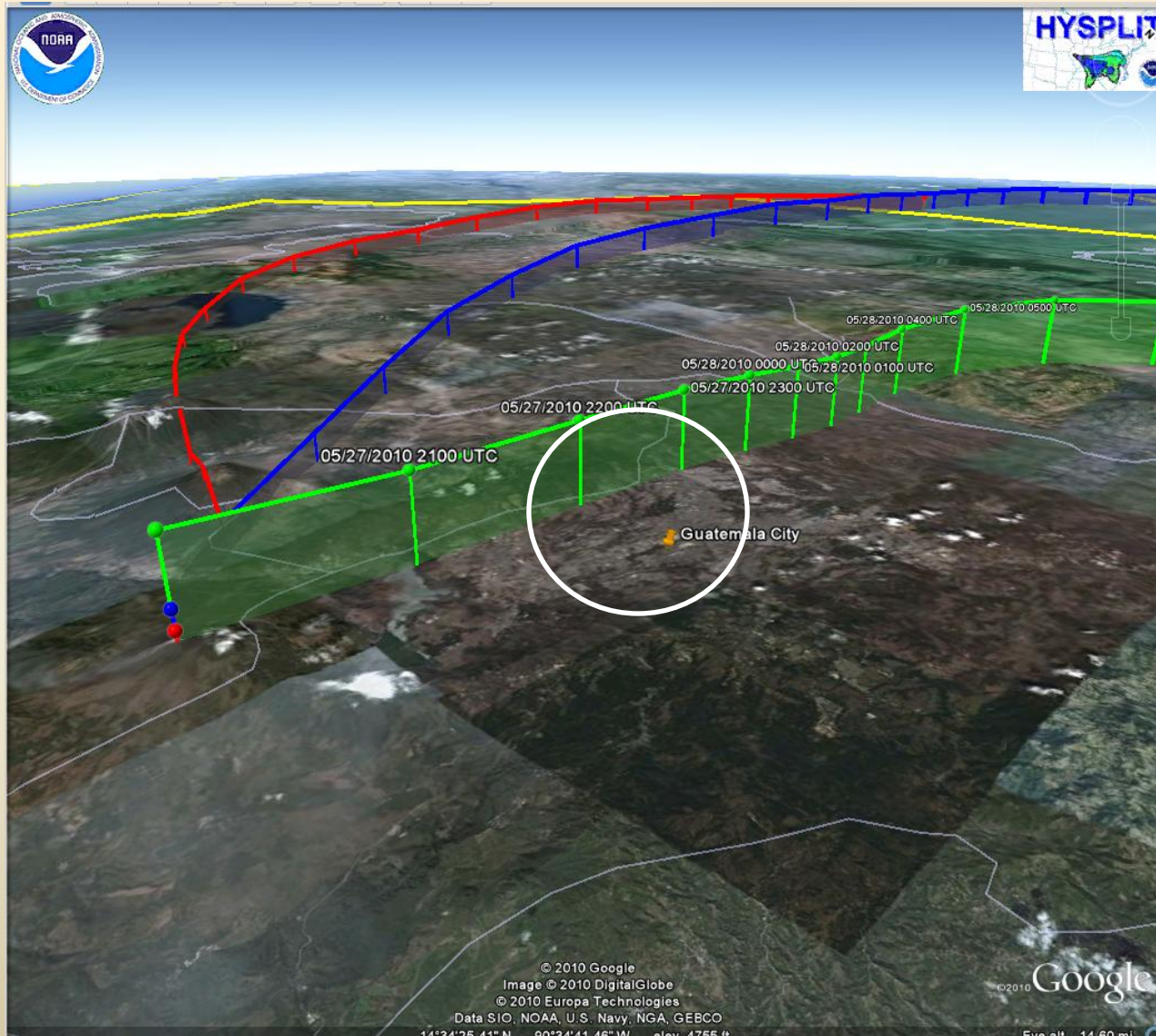- Multiple deaths and missing people

http://ready.arl.noaa.gov/hysplit-bin/trajresults.pl?jobidno=315562
http://www.ready.noaa.gov/ready/hysplit4.html

Location

Trajectory of Air that Carried Ash

Timing of Ash

According to this trajectory, ash should have fallen over Guatemala City on May 27th, around 2200 UTC, 2 hours after the volcano erupted.